CLAIMS:

1. A mass spectrometer comprising:

an ion source for producing sample ions;

an ion interface;

a reaction/collision cell section, with the ion interface providing an interface to the ions between the ion source and the reaction/collision cell section; and

an ion-neutral decoupling device provided between the ion interface and the reaction/collision cell section, to provide substantial separation between ions and neutral particles, whereby only ions pass on to the reaction/collision cell section.

2. A mass spectrometer system as claimed in claim 1, wherein the ion-neutral decoupling device comprises one of: a plate or a plurality of plates including apertures with the apertures offset from one another to prevent direct passage of neutral gas particles; a plurality of pairs of rods provided with slots for passage of ions and offset so as to interrupt passage of neutral gas particles; an electrostatic quadrupole 90° deflector; and electrostatic sector deflector; a magnetic sector deflector; an obstruction preventing direct flow of neutral gas particles from the ion interface to the reaction/collision cell section; and a plate including an offset aperture and defining an intermediate pressure chamber between the ion interface and thereaction/collision cell section.

3. A mass spectrometer system as claimed in claim 2, which includes an ion optics compartment, wherein the ion-neutral decoupling device is provided in the ion optics compartment.

4. A mass spectrometer system as claimed in claim 3, wherein the reaction/collision cell section includes a collision cell provided with a collision gas.

5. A mass spectrometer system as claimed in claim 4, which includes a mass analyzer downstream from the collision cell, for analyzing ions after collision and/or reaction in the collision cell.

Sub A6

6. A method of operating a mass spectrometer system, in which ions are generated and subject to mass analysis, the method comprising:

(i) supplying a sample to an ion source and generating a stream of ions, including sample ions and unwanted neutral particles;

(ii) separating neutral particles from the ion stream;

(iii) passing the ion stream into a reaction/collision cell section for analysis.

7. A method as claimed in claim 6, wherein step (ii) includes subjecting the ions to deflection, utilizing deflection of the ions, while permitting the neutral gas flow to continue undeflected.

8. A method as claimed in claim 6, which includes passing the ion stream and neutral gas particles through a series of apertures in plates, the apertures being offset, and providing an electrostatic field to drive the ions through the apertures and the plates, the offset apertures serving to obstruct direct flow of neutral particles.

Sub A7

9. A method as claimed in claim 6, which includes generating the ion stream at atmospheric pressure, passing the ion stream through an aperture into an ion optics compartment maintained at a substantially sub-atmospheric pressure, thereby to generate an expanding supersonic jet, wherein step (ii) includes obstruction the supersonic jet, thereby to prevent the kinetic energy of the jet promoting passage of neutral particles into the reaction/collision cell section.

10. A method as claimed in claim 6 wherein the mass analysis step includes passing the ions into a collision cell for collision and/or reaction, and subsequently subjecting the ions to mass analysis.